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(54) Connection device with bolt to selectively connect two components

(57) Connection device able to selectively connect two components, comprising a containing element (12) able to be coupled with a first of the two components. The connection device also comprises a bolt element (13), inserted slidingly inside the containing element (12) and able to be coupled with the second of the two components. The bolt element (13) is normally positioned in a first position, active and stable, in which the bolt element (13) at least partly protrudes from the containing element (12). The bolt element (13) is able to be magnetically switched to a second position, inactive and stable, in which the bolt element (13) is retracted inside the containing element (12) without interfering with the second component.

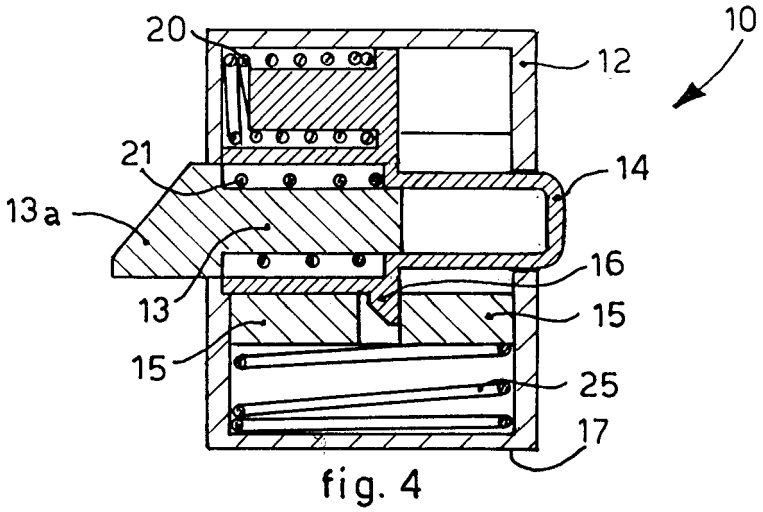

fig. 4

EP 2 011 938 A1

Description

FIELD OF THE INVENTION

[0001] The present invention concerns a connection device with a bolt to selectively connect two components, preferably but not only used in the furnishing field, in order to make up and/or take apart furniture components, such as for example wood paneling, covers, shelves, backs, doors or other components.

[0002] The device according to the present invention is also applicable in clamping systems, or safety systems, for panels, doors, trunks, bags, or other products provided with a fixed part and an opening part.

BACKGROUND OF THE INVENTION

[0003] A connection device with bolt is known, with a magnetic command, like the one described in GB-A-2,145,461.

[0004] This known device comprises a bolt sliding axially inside a containing element, between a closed position and an open position. The known device, with the bolt in the closed position, achieves a stable coupling of two components to be connected. The bolt is coupled with a block, sliding orthogonally thereto and having a magnet at one end. The block is connected to the bolt by means of an arched lever, so that a sliding of the block corresponds to a sliding of the bolt between the two positions, open and closed. The known device also comprises a fixed element made of ferromagnetic material, against which the magnet of the block tends to go, so that the latter is normally kept in a determinate stable position, to which the closed position of the bolt corresponds.

[0005] To cause the movement of the bolt, between its stable closed position and its open position and the consequent separation of the two components coupled together, it is necessary to bring an actuation magnet near to the known device, which attracts the magnet of the block. The actuation magnet must be brought near with the correct polarity, and exert a greater magnetic attraction than that exerted by the magnet in the block on the fixed element made of ferromagnetic material.

[0006] The known device is not only costly, due to the presence of a magnet inside it, but also has the disadvantage that the bolt is kept in its open position in an unstable manner and only when the actuation magnet is brought near with the correct polarity to the device. In fact, the bolt and the block connected to it always tend to return to their only stable position, that is, the closed position. Consequently, the separation of the two components can take place only by correctly bringing the actuation magnet near to the known device.

[0007] This disadvantage is particularly obvious when several known devices are coupled to the same component, since the opening of the corresponding bolts can only take place if an equal number of actuation magnets are brought near to the device simultaneously and with the correct polarity.

[0008] One purpose of the present invention is to achieve a connection device with a bolt which allows a quick and easy connection and/or disconnection of the components, even when there are several devices coupled to the same component.

[0009] Another purpose is to prevent the use of costly components, such as permanent magnets inside the device.

[0010] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0011] The present invention is set forth and characterized in the independent claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0012] A connection device according to the present invention is used to connect two components, and comprises a containing element, able to be coupled with a first of the two components to be connected, and a bolt element able to cooperate with the second of the two components. The bolt element is axially slidable inside the containing element and is normally positioned in a first position, active and stable, which prepares the connection device for the connection of the two components. In fact, in the first position the bolt element at least partly protrudes from the containing element and can be inserted into the second of the two components to be connected, or into an element connected therewith.

[0013] According to a characteristic feature of the present invention, the bolt element is able to be switched to a second position, inactive and stable, in which it is retracted inside the containing element and does not interfere with the second component, or with the element connected therewith. Advantageously, the movement, that is, the switching, of the bolt element between the first and the second position, both stable, is performed magnetically, that is, by applying a magnetic field generated externally to the connection device, for example by means of a permanent magnet, an electromagnet or any other known manner.

[0014] When the bolt element is switched to said second position, the device according to the present invention is therefore ready to separate the two components.

[0015] The connection device according to the present invention also comprises a reloading element connected to the bolt element. The reloading element is mobile inside the containing element, elastically contrasted, for example by a first elastic element, between a loading position, corresponding to the first position of the bolt element, and a reloading position corresponding to the second position of the bolt element. The reloading element is manually drivable and is able to switch the bolt

element from the second position to the first position.

[0016] The bolt element is axially mobile, inside the reloading element, due to the effect of a second elastic element interposed between them, so that, in its active position, it can be temporarily and elastically inserted in the containing element, applying an axial thrust thereon.

[0017] The connection device according to the present invention also comprises a ferromagnetic element, that is, at least partly made of ferromagnetic material, which is able to clamp the reloading element. The ferromagnetic element is constantly thrust by a third elastic element against the reloading element and kept in a clamping position, corresponding to the reloading position. The ferromagnetic element is also mobile inside the containing element and movable to a release position, corresponding to the reloading position due to the effect of an external magnetic field.

[0018] Moreover, a stop element is associated with the reloading element, able to cooperate with the ferromagnetic element.

[0019] When it is switched to the active position, the bolt element is kept stably in said position. In fact, the stop element is inserted into a corresponding cavity or recess of the ferromagnetic element and clamps the stop element stably, together with the reloading element.

[0020] According to a characteristic feature of the present invention, when a magnetic element is brought near to the connection device, the bolt element is automatically switched from its active position to its inactive position. This switching occurs because the ferromagnetic element, subjected to an action of magnetic attraction greater than the elastic thrust exerted by the third elastic element acting thereon, is moved from its initial position. In this way the stop element associated with the reloading element exits from the cavity of the ferromagnetic element and the reloading element, thrust by the first elastic element, is moved with respect to the containing element. During this movement, the reloading element draws the bolt element with it, which is thus retracted inside the containing element, and remains in this position even after the magnet has been distanced, due to the effect of the force exerted on the reloading element by said first elastic element.

[0021] The bolt element is able to be moved manually to the active position, by thrusting the reloading element axially toward the inside of the containing element.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a lateral view of a connection device according to the present invention associated with two components to be connected;
- fig. 2 is a plane view of the device in fig. 1;
- fig. 3 is a three-dimensional view of the device in fig. 1;
- fig. 4 is a section view from IV to IV of fig. 2;
- fig. 5 is a partly sectioned view of the device in fig. 3, in a first working condition;
- fig. 6 is a partly sectioned view of the device in fig. 3, in a second working condition;
- fig. 7 is a section view of a variant of the connection device.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

[0023] With reference to fig. 1, a connection device 10 according to the present invention is used to selectively connect two components 11a and 11b such as for example furnishing elements.

[0024] The connection device 10 comprises a containing element 12 having a lower surface 17 (fig. 4) able to rest on and be attached to the component 11a.

[0025] Inside the containing element 12, a bolt element 13, a reloading element 14 and a ferromagnetic element 15 are disposed.

[0026] The reloading element 14 slides axially inside the containing element 12 and the bolt element 13 slides axially with respect to the reloading element 14.

[0027] The bolt element 13 comprises a wedge end 13a and is selectively positionable between a first position, active and stable, in which the wedge end 13a protrudes from the containing element 12 and can be inserted into the component 1 b, and a second position, inactive and stable, in which the wedge end 13a is retracted inside the containing element 12.

[0028] The axial sliding of the reloading element 14 (fig. 4), between a loading position corresponding to the first position of the bolt element 13, and a reloading position, corresponding to the second position, is elastically contrasted by the action of a first helical spring 20 acting between an internal wall of the containing element 12 and the reloading element 14 itself. The reloading element 14 comprises a stop tooth 16 able to cooperate with the ferromagnetic element 15. The axial sliding of the bolt element 13 inside the reloading element 14 occurs due to the effect of the action of a second helical spring 21. Therefore, by applying an axial thrust on the wedge end 13a of the bolt element 13 it is possible to determine the elastic movement of the latter from its first position to its second position.

[0029] The ferromagnetic element 15 is mobile inside the containing element 12 in a direction substantially orthogonal to the direction of sliding of the bolt element 13 and of the reloading element 14, and is able to clamp the reloading element 14. The ferromagnetic element 15 is held in a clamping position corresponding to the loading position, constantly thrust against the reloading element 14 due to the effect of a third helical spring 25 acting between a lower wall of the containing element 12 and

a lower surface of the ferromagnetic element 15. The ferromagnetic element 15 also comprises a cavity 18, able to cooperate with the stop tooth 16 of the reloading element 14.

[0030] The switching of the bolt element 13 from the first to the second position occurs by bringing an actuation magnet near to the connection device 10 in proximity with the ferromagnetic element 15. Following this movement, an action of magnetic attraction is produced on the ferromagnetic element 15 which overcomes the elastic thrust normally exerted by the third helical spring 25. In this way, the ferromagnetic element 15 is attracted toward the lower wall of the containing element 12 and moved to a release position, causing the relative emergence of the stop tooth 16 of the reloading element 14 from the cavity 18 of the ferromagnetic element 15.

[0031] In this way the reloading element 14 is subjected only to the elastic thrust produced by the first helical spring 20. The reloading element 14 is then moved with respect to the containing element 12 toward an internal rear wall of the containing element 12, up to the final position (fig. 6) in which it partly protrudes with a rod 14a outside the containing element 12. In this movement the bolt element 13 is also drawn by the reloading element 14, due to the effect of the second helical spring 21, and is therefore switched and held stably in the second position due to the effect of the thrust exerted by said first helical spring on the reloading element 14.

[0032] The switching of the bolt element 13 from the second position to the first position occurs by axially thrusting the rod 14a of the reloading element 14 from outside the containing element 12 until the elastic action exerted by the first helical spring 20 is overcome. The reloading element 14 is moved until it reaches a position in which the stop tooth 16 is positioned in correspondence with the cavity 18 of the ferromagnetic element 15. In this position, due to the effect of the elastic thrust produced by said third helical spring 25, the ferromagnetic element 15 is thrust toward the reloading element 14. In this way the stop tooth 16 of the reloading element 14 is inserted into the cavity 18 of the ferromagnetic element 15 and stably clamped in this position due to the effect of the third helical spring 25. Consequently, the bolt element 13 is also thrust by the reloading element 14 until it is switched to the first position.

[0033] With reference to fig. 7, where the parts not described are identical to those reported in the previous drawings, a variant of the connection device 10 according to the present invention is shown. According to this variant the stop tooth 16 is associated with the ferromagnetic element 15 and cooperates with the cavity 18 made in the reloading element 14. The ferromagnetic element 15 is cylindrical in shape and is able to slide in a direction substantially orthogonal to the direction of sliding of the bolt element 13, inside a cylindrical guide 32 of the containing element 12. The ferromagnetic element 15 is held in the clamping position, corresponding to the loading position, constantly thrust against the reloading element 14 due to the effect of the third helical spring 25 acting between a lower wall of the containing element 12 and a circular crown 34 of the ferromagnetic element 15. In this variant too of the connection device 10, the bringing near of an actuation magnet causes the attraction of the ferromagnetic element 15 and the subsequent emergence of the stop tooth 16 of the ferromagnetic element 15 from the cavity 18 of the reloading element 14.

[0034] It is clear that modifications and/or additions of parts may be made to the connection device 10 as described heretofore, without departing from the field and scope of the present invention.

[0035] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of connection device, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Connection device able to selectively connect two components (11), comprising a containing element (12) able to be coupled with a first of said two components (11), a bolt element (13), inserted slidingly inside said containing element (12) and able to be coupled with a second of said two components (11), wherein said bolt element (13) is normally positioned in a first position, active and stable, in which said bolt element (13) at least partly protrudes from said containing element (12), **characterized in that** said bolt element (13) is able to be magnetically switched to a second position, inactive and stable, in which said bolt element (13) is retracted inside said containing element (12) without interfering with said second component (11).

2. Device as in claim 1, **characterized in that** it also comprises a reloading element (14) connected to said bolt element (13), movable, due to the effect of a first elastic element (20), between a loading position, which corresponds to said first position of said bolt element (13), and a reloading position which corresponds to said second position of said bolt element (13).

3. Device as in claim 2, **characterized in that** said reloading element (14) is disposed coaxial with said bolt element (13) and is connected thereto by means of a second elastic element (21).

4. Device as in claim 3, **characterized in that** said reloading element (14) comprises a stop element (16) able to cooperate with a ferromagnetic element (15) held in a clamping position, corresponding to said loading position, by a third elastic element (25) and

movable to a release position corresponding to said reloading position, due to the effect of an external magnetic field.

5. Device as in claim 4, **characterized in that** said stop element (16) is able to be inserted into a cavity (18) of said ferromagnetic element (15) in said clamping position so as to keep said reloading element (14) stable in said loading position.

6. Device as in claim 3, **characterized in that** said reloading element (14) comprises a cavity (18) able to cooperate with a ferromagnetic element (15) kept in a clamping position, corresponding to said loading position, by a third elastic element (25) and movable to a release position corresponding to said reloading position, due to the effect of an external magnetic field.

7. Device as in claim 6, **characterized in that** said cavity (18) is able to cooperate with a stop element (16) of said ferromagnetic element (15) in said clamping position in order to keep said reloading element (14) stable in said loading position.

8. Device as in one of claims 5 or 7, **characterized in that** said ferromagnetic element (15) is able to determine the relative emergence of said stop element (16) from said cavity (18) in said release position.

9. Device as in claim 8, **characterized in that** said first elastic element (20) is able to keep said reloading element (14) stable in said reloading position.

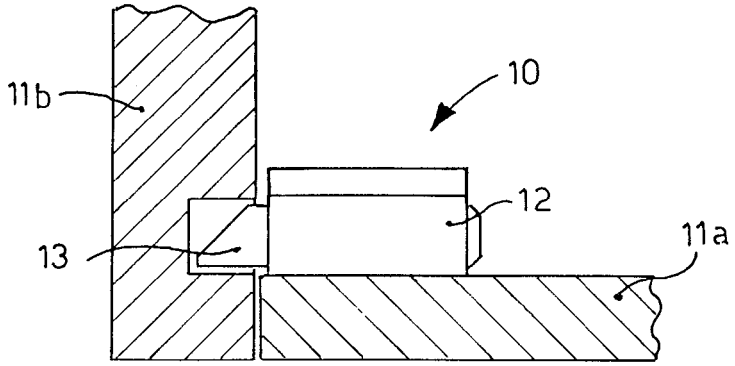

fig. 1

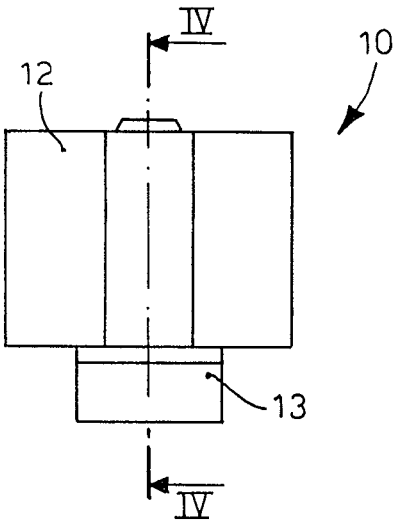

fig.2

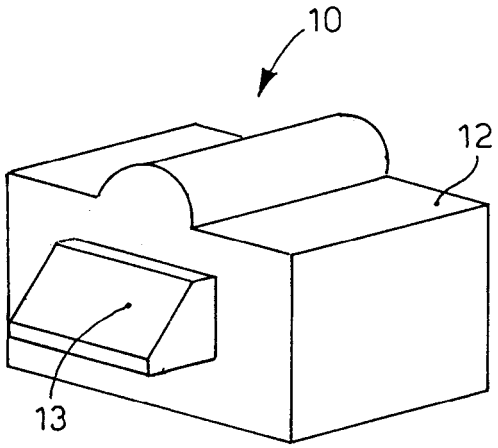

fig. 3

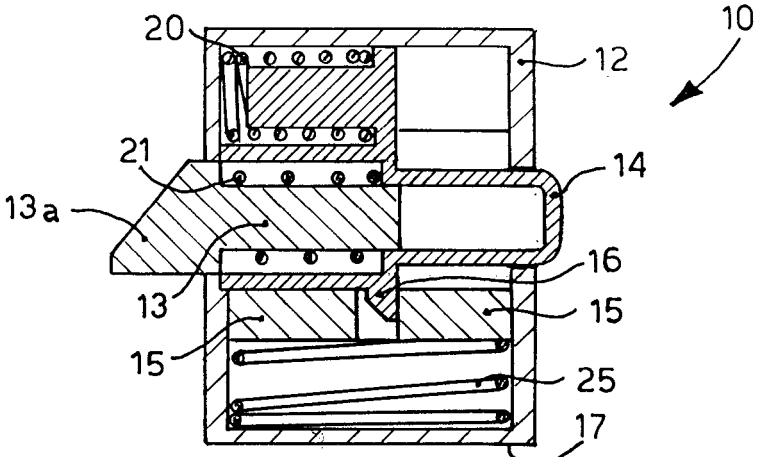

fig. 4

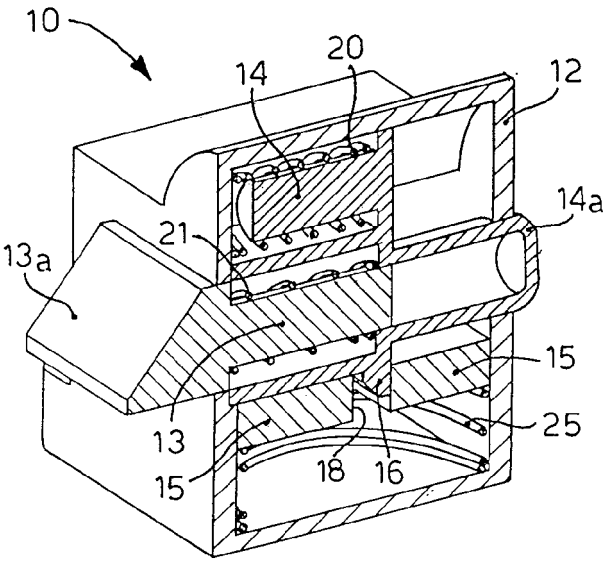

fig. 5

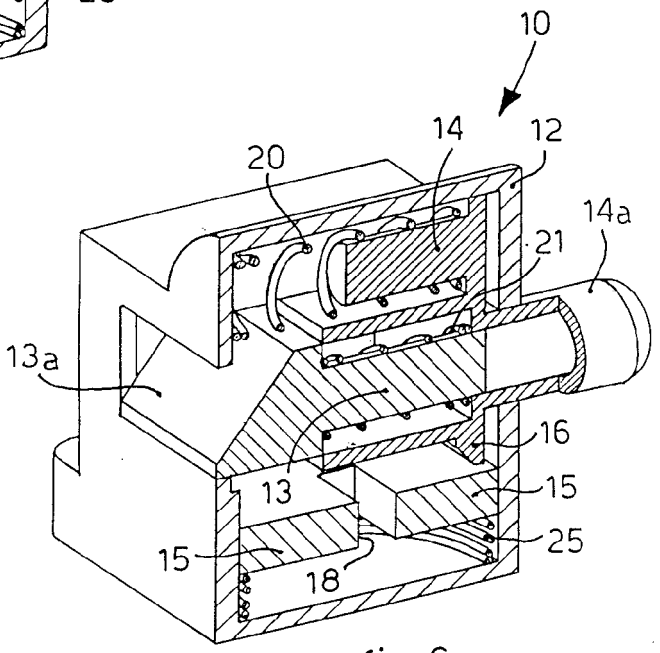

fig. 6

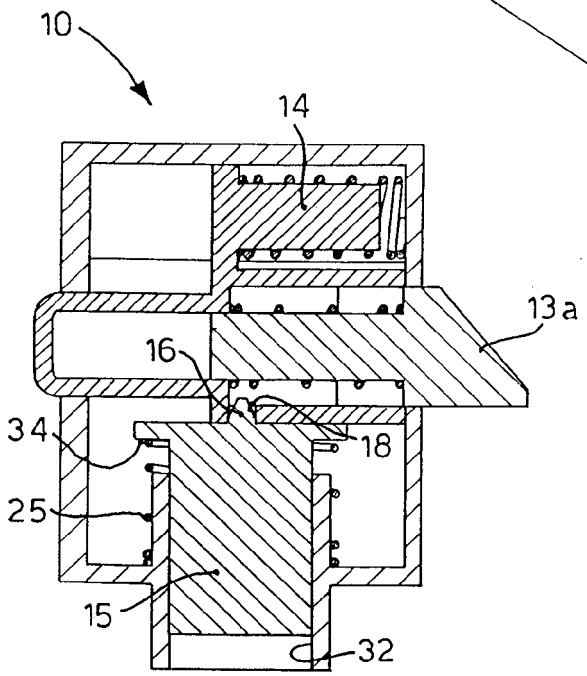

fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 9586

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 981 307 A (PIERRE-ALBERT DUET) 24 May 1951 (1951-05-24) * page 2, column 1, line 21 - line 46; figures 1,1a *	1	INV. E05B47/00
X	US 4 293 154 A (CASSELLS MELVIN K) 6 October 1981 (1981-10-06) * column 2, line 31 - column 4, line 60; figures 1-6 *	1	
X	WO 2006/064260 A (LAPORTA GIOVANNI MARIA) 22 June 2006 (2006-06-22) * page 6, line 18 - page 7, line 12; figures 6-11 *	1	
X	US 5 386 713 A (WILSON BERT) 7 February 1995 (1995-02-07) * column 7, line 33 - column 8, line 6; figures 11,12 *	1,2	
D,A	GB 2 145 461 A (RICHARDS ROGER CONINGTON) 27 March 1985 (1985-03-27) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC) E05B A45C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 October 2008	Perez Mendez, J

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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